# Interference from Air-to-Ground Band Wideband Systems to Public Safety, Specialized Mobile Radio, and Cellular Licensees

Presentation to the Federal Communications Commission

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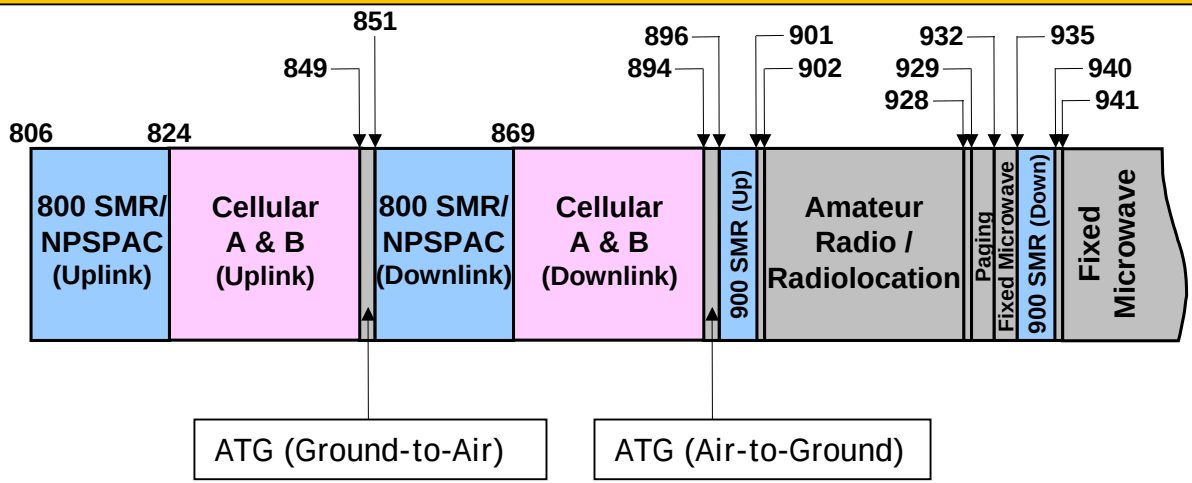
# Nextel, Public Safety, and ATG




- The current Air-to-Ground (ATG) block is comprised of two bands of spectrum at 849-851 MHz and 894-896 MHz.
- The ATG allocation is immediately adjacent to specialized mobile radio (SMR) licensees, such as Nextel, in the 800 MHz and 900 MHz bands, public-safety, and cellular A and cellular B block.
- Depending on Nextel's response to the FCC's *800 MHz Reconfiguration Order*, public-safety operations may also occupy spectrum immediately adjacent to lower ATG band at 849-851 MHz.



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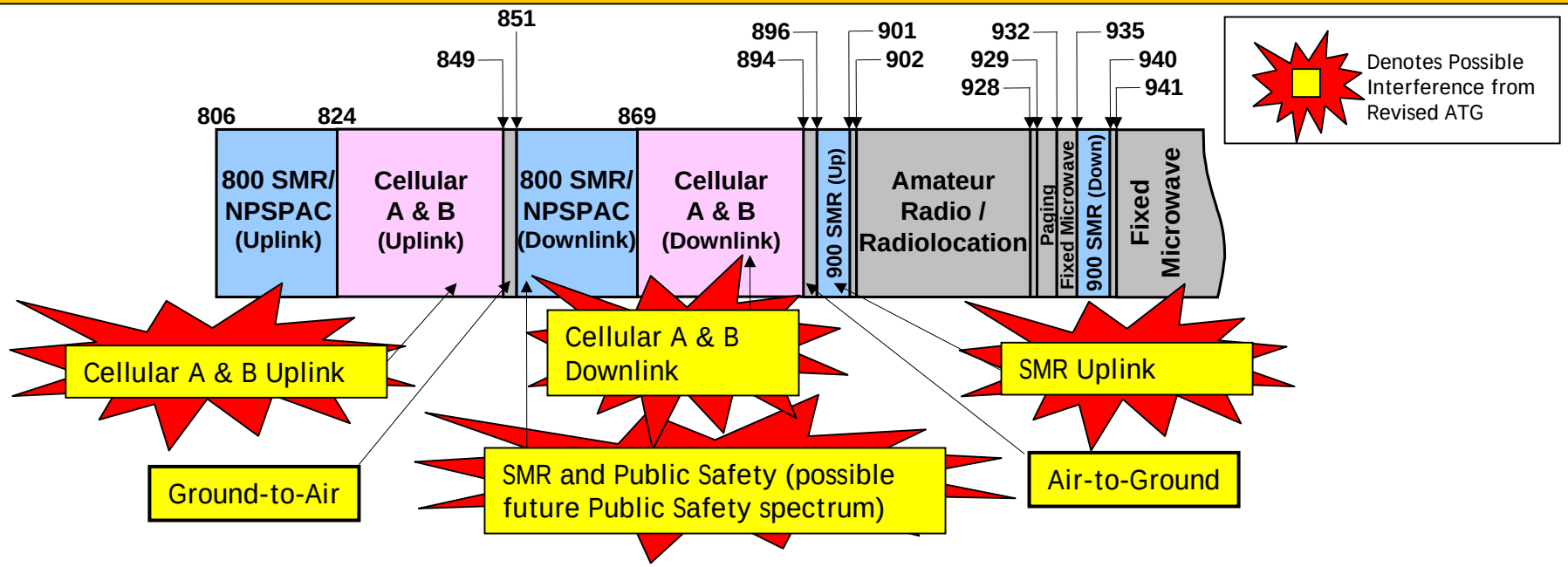
# WATG Victim Bands:
## Public Safety, SMR, and Cellular A & B




- Any of the proposals to reconfigure the ATG bands to permit wideband ATG (WATG) could increase interference into the 800-900 MHz operations of SMR, Cellular, and Public-Safety licensees.
  - Proposals to reconfigure the ATG block, such as that of Verizon, are not "modest modifications," as Verizon has claimed.
  - Rather, WATG demands many more towers, more power, higher emissions, and much more intensive use than anything existing in the ATG bands today.



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# No Record on Interference

- No record evidence addresses the serious potential for inter-band interference for any of the numerous proposals for WATG band reconfiguration before the Commission.
  - While some pleadings address the technical viability of the WATG proposals or the potential for intra-band interference among competing WATG providers, no inter-band interference analysis or testing exists for any of the numerous WATG band reconfiguration options.
  - Only two parties' comments – those of AMTA and Motorola – even mention the potential for interference from WATG to SMR, Cellular, and Public Safety, and these parties mention this issue only in passing.
- Verizon's proposal to grab the entire ATG band for itself without testing or competitive bidding is self-serving and anti-competitive.



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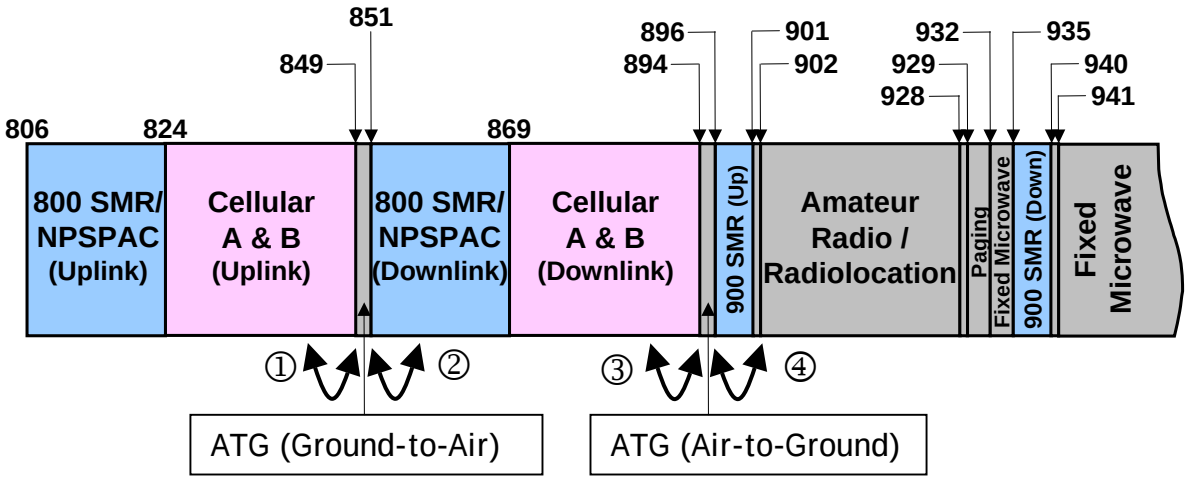
# Proceed Cautiously with WATG

- Nextel's analysis indicates that adjacent band interference is extremely likely under any of the proposed reconfigurations, but additional information is needed for a complete analysis.
  - On Oct. 12, **APCO** said it was "**very concerned**" about interference and "urge[d] the Commission to postpone action" until interference problems are resolved.
  - On Oct. 20, **CTIA** said adjacent-band interference created "**cause for concern**" and has urged the FCC to proceed "**only if it has completed a valid assessment**," including testing, if warranted, of the potential for adjacent-band interference.
- The 800 MHz band is already plagued with interference, and the FCC has spent more than two-and-a-half years trying to resolve interference problems in the band.
  - The complex, $4.86 billion plan that the FCC adopted to resolve interference that public safety users receive in this band required years of effort and significant cooperation from both the private sector and public-safety licensees.
  - WATG could exacerbate the 800 MHz public-safety interference problem.
  - The FCC should analyze and test the potential for adjacent-band interference near both the 800 MHz WATG uplink and downlink bands.

# WATG Increases Interference

- The four principal parties have offered more than a dozen different ways in which the FCC could authorize WATG in the ATG bands.
  - These proposals are found almost exclusively in a series of loosely drafted *ex parte* presentations that have largely evaded public scrutiny.
  - These proposals continue to change even in the final days before a presumptive FCC vote.
  - The variables and unknowns include: the number of operators, the number of towers and/or balloons involved, the bandwidth assigned, the types of duplexing used, the types of polarization used, the permissible altitude for operation, the cell sizes, the expansion potential, and more.
- Based on what little is known of the proposals, however, two generic options are offer some sense of the potential adjacent-band interference issues:
  - Traditional Banding: authorize WATG to operate in the same direction as the existing ATG bands.
  - Reverse Banding: authorize WATG to operate using "reverse duplexing" or in the opposite direction as existing ATG bands.
- Either of these generic approaches will cause harmful interference to Public Safety licensees, SMR operations, and Cellular A & B.

# WATG Interference Cases




| Case | ATG Allocation | Adjacent Neighbor |
|---|---|---|
| 1 | Downlink (Ground-to-Air) | Cellular Uplink |
| 2 | Downlink (Ground-to-Air) | SMR/Public Safety |
| 3 | Uplink (Air-to-Ground) | Cellular Downlink |
| 4 | Uplink (Air-to-Ground) | 900 MHz SMR Uplink |



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# WATG Harmful Interference

- WATG Traditional Banding creates a very high likelihood of harmful interference for:
  - *Rebanded Public Safety NPSPAC at 800 MHz*. (Mobile Receive)
    - These licensees are not interference tolerant and are particularly susceptible to OOBE interference from ground based WATG operations, especially those focused on serving customers during takeoff, landing, and taxiing.
  - *SMR Operations at 800 MHz.* (Mobile Receive)
    - These licensees are also particularly susceptible to ground based WATG operations, especially those focused on serving customers during takeoff, landing, and taxiing.
    - SMR will not vacate the band for at least two and a half years, yet WATG operations could commence as early as 2005.
  - *Cellular A & B Uplink at 824-849 MHz.* (Mobile Transmit/Base Receive)
    - Cellular A & B uplinks may suffer interference depending on system configuration. While Verizon is a licensee in this band and can presumably tolerate self-interference, many other Cellular A & B licensees exist and cannot self-coordinate.



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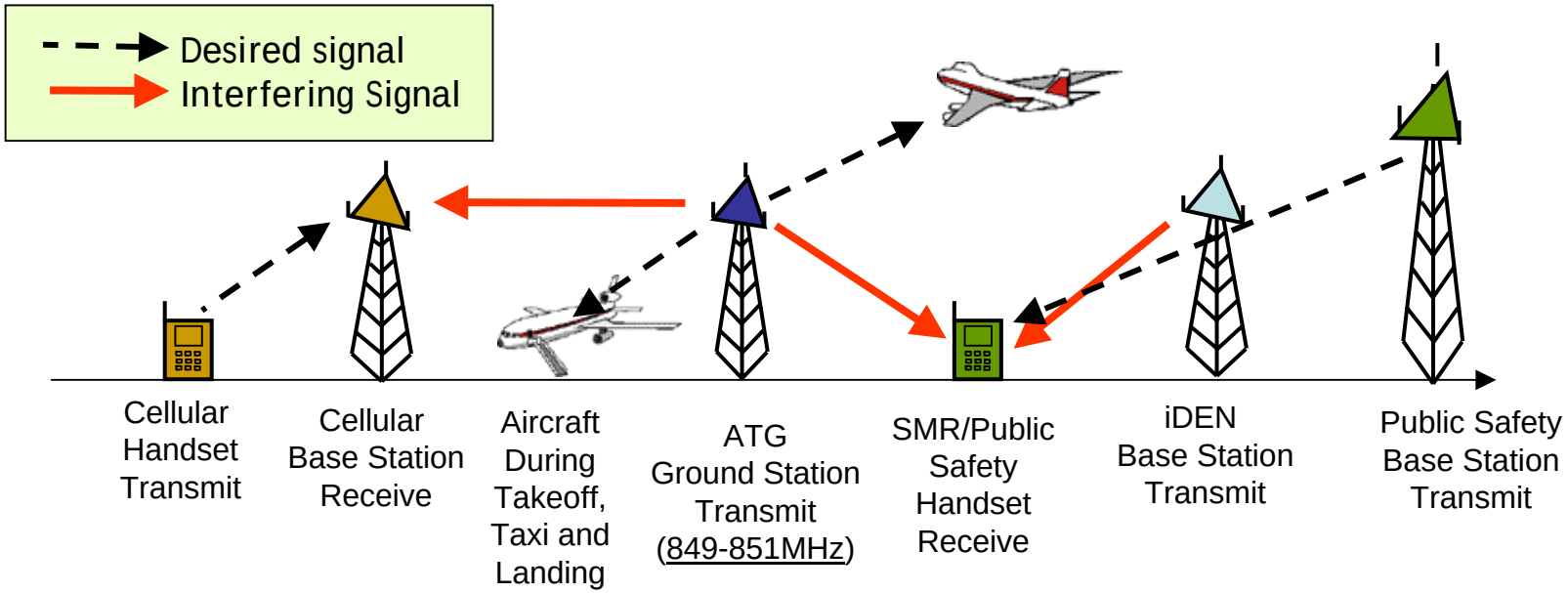
# WATG Interference near 849-851 MHz




- ATG base stations may cause interference to public safety handsets
- ATG base station may also cause interference to nearby cellular base stations



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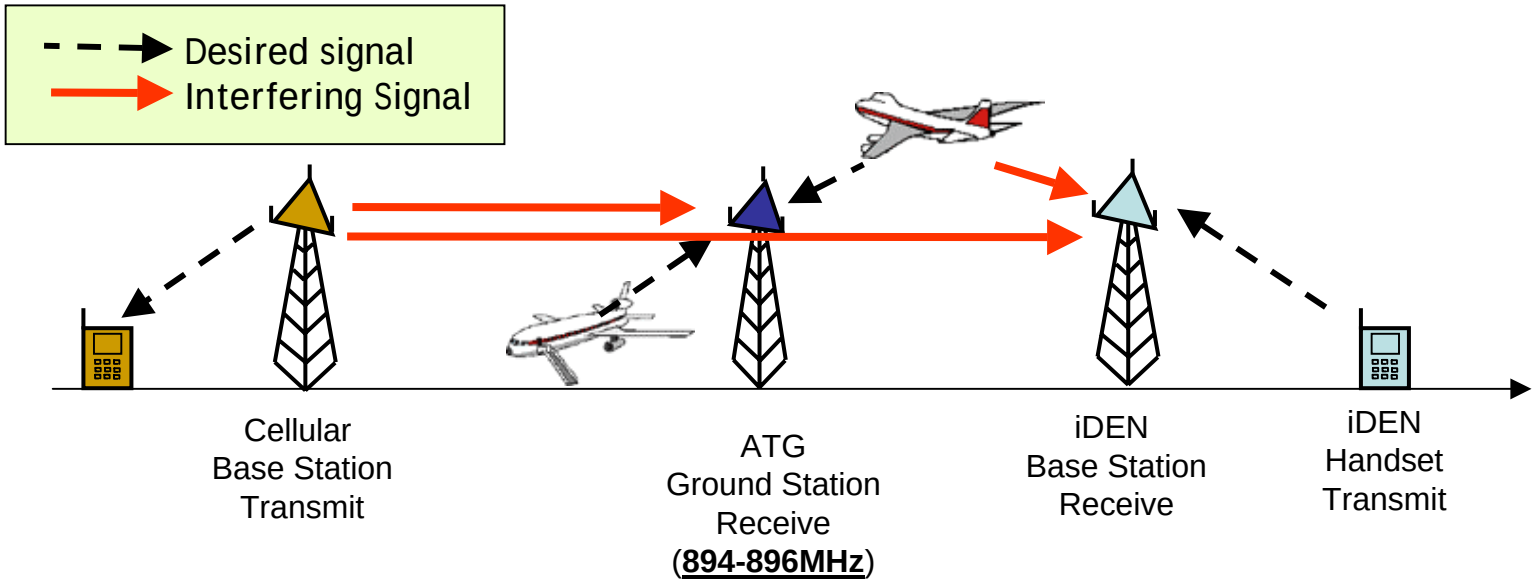
# WATG Interference near 894-896 MHz




- Cellular base stations already generate significant interference to iDEN base stations and will cause harmful interference to ATG base stations
- ATG aircraft transmission may have a line-of-sight with iDEN base station antenna, causing interference to iDEN systems



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# WATG Harmful Interference

- WATG Reverse Banding creates a very high likelihood of harmful interference for:
  - *Cellular A & B band.*
    - These licensees face the possibility of experiencing the same type of OOBE interference that currently exists in the 800 MHz SMR band.
  - *SMR Operations at 800 MHz.*
    - SMR will not vacate the band for at least two and a half years, yet WATG operations could commence as early as 2005.
  - *SMR Operations at 900 MHz.*
    - SMR already faces severe interference from Cellular A & B downlink operations at 824-849 MHz.
    - Aircraft transmitters will increase out-of-band emissions and may have a line-of-sight with 900 MHz base stations, which would cause debilitating interference to SMR operations at 900 MHz.
  - *Naval Radar Operations.*
    - The United States Navy AN/SPS-49 air search radar systems in nearby spectrum could suffer harmful interference under a reverse-banding approach.

# One "Solution" Creates New Problems

- Rather than attempt to solve the new problems WATG will create through mandatory after-the-fact interference mitigation measures, the FCC should to establish stringent out-of-band-emission limitations to mitigate the potential for interference before it occurs.
- Applying the *800 MHz Report and Order* approach to the newly created WATG interference source in the 800 MHz band will not solve all of these problems and will create new problems for public safety, SMR, and Cellular A & B.
- Applying the *800 MHz Report and Order* approach creates a reactive interference resolution environment; the FCC would have to expand protection to ***ALL*** SMR and cellular licensees.
  - It is unclear how newly established WATG operators would be integrated into the carefully balanced interference solution that the FCC adopted in the *800 MHz Report and Order.*
  - It is also unclear how much of an increase in the noise floor WATG operations will create and what effect this increase will have on public-safety, SMR, and cellular operations under the *800 MHz Report and Order*.



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# Analysis and Testing Required

- Extensive analysis and testing is warranted *in this case* because the record is extremely limited.
- Nextel and other incumbents lack the information necessary to fully evaluate the impact of these proposals.
- Public safety entities are not in a position to conduct their own analysis and tests of the proposals.
- The FCC should make every effort to ensure that its reconfiguration of the service rule for ATG spectrum do not add to the already existing problem in the 800 MHz band.
  - The 800 MHz band has a long and troubled history of interference;
  - The 800 MHz band is itself the subject of a massive potential reconfiguration.
  - If the FCC were simply considering *allocating* spectrum for ATG, extensive testing would not be required.
  - In this case, however, the FCC intends to adopt *service rules* for ATG in a band with a long history of chronic interference, and at least one operator vows to commence service next year.

# Conclusion

- Any of the proposals to reconfigure the ATG bands could increase interference into the 800-900 MHz operations of SMR, Cellular, and Public-Safety licensees.
  - No party to this proceeding has addressed inter-band interference in any meaningful way.
  - The Commission should proceed extremely cautiously due to the long legacy of interference to public safety licensees in the 800 MHz band.
  - The Commission should demand more analysis and field testing.
- The Commission should exhaustively consider inter-band interference issues before adopting an order in this docket and, at a minimum, should not make any decisions until further technical analysis and limited field tests are conducted on public safety, SMR, and cellular operations.